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ABSTRACT

The combination of technology applications and an understanding of developmental pathways theory enhances intellectual growth for preservice teachers. Utilizing the theories developed by Dr. James Comer and integrating them with state of the art technological applications, this paper describes one model of preservice education that has been remarkably successful in bridging the gap between synchronous and asynchronous instruction. The developmental pathways are divided into the following areas: physical, cognitive, psychological, social, ethical, and language. The paper focuses on the utilization of the developmental pathways in an educational foundations course taught at Drury University (Missouri). Examples of technological applications for each pathway are presented and discussed. (Contains 18 references.) (Author/MES)

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Developmental Pathways and Technology:

The Foundations of Enhanced Intellectual Excellence

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Abstract:

The combination of technology applications and an understanding of developmental pathways theory enhances intellectual growth for pre-service teachers. Utilizing the theories developed by Dr. James Comer and integrating them with state of the art technological applications, this paper describes one model of pre-service education that has been remarkably successful in bridging the gap between synchronous and asynchronous instruction. The developmental pathways are divided into the following areas: physical, cognitive, psychological, social, ethical, and language. The authors currently use the ERes system to help deliver their education courses. Examples of technological applications for each pathway are presented and discussed.

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Schools are dynamically and continuously changing systems (Comer, 1993) serving students who are currently facing crisis-level issues ranging from academic achievement to psychosocial development. The Comer School Development Program is identified as a school reform project that focuses on both academic performance and behavior modification (Cook, Hunt, & Murphy, 1998). Significant results in the areas of school climate, classroom climate, academic achievement, school adjustment, and self-concept have been attributed to the Comer School Development Program (Comer & Emmons, in press). Dr. James Comer utilizes "a metaphor of six developmental pathways to characterize the lines along which children mature – physical, cognitive, psychological, language, social, and ethical" (Comer, Ben-Avie, Haynes, & Joyner, 1999, p. 3). The developmental pathways require a review of "the central core of teaching and learning, which is usually defined as curriculum and instruction (which has now been) expanded to include child development and relationships" (Gillette, 1995, p. 75). Teaching and learning must use child development as an educational foundation and relationships as the "vehicle for learning" (Gillette, 1995, p. 81) to provide an effective schooling experience. The complexity of the developing children requires that educators view them in a holistic manner. The developmental pathways act as "a thread that makes sense by looking at its place in the whole tapestry" (Gillette, 1995, p. 79).

When the developmental pathways are combined with the current rise in technological pedagogy a new educational paradigm is manifested. What part do the developmental pathways play in the utilization of current technological trends and pedagogical practices? How can the intellectual potential for excellence be harnessed by recognizing and addressing the synergistic relationships existing between technology and

the developmental pathways? This paper seeks to answer this question by focusing on the utilization of the developmental pathways in an educational foundations course taught by the authors at Drury University.

The Developmental Pathways

The Social Pathway

The social development of students is enhanced by healthy interpersonal relationships in a wide variety of social settings. Learning is a social enterprise and can be enhanced when students have the opportunity to work collaboratively on complex, structured group activities. Social development also implies the gaining of skills and expertise to be comfortable in varied social contexts (Comer, 1999).

The Ethical Pathway

The ethical development of students involves the ability to reason and make conscious decisions to behave in certain ways. Children develop ethically in the transition from distinguishing between desirable and undesirable behaviors to possessing the ability to understand ethical principles and using these principles to regulate their own actions (Comer, 1999). Other research has been conducted on this phase of development by Kohlberg (1984) and Gilligan (1982).

The Physical Pathway

The physical development of students refers to the biological maturation of the child. It involves more than the obvious manifestations of size, shape, and physical characteristics. It also includes hand-eye coordination, dexterity, visual acuity, and auditory perception (Comer, 1999).

The Cognitive Pathway

The cognitive developmental pathway involves the capacity to think, plan, solve problems, and accomplish goals (Comer, 1999). Within this developmental pathway the child's ability to think and to use his or her mind to handle challenges is addressed. The cognitive component emphasizes flexibility of thought, the aptitude to manipulate information, and the skill to manipulate the environment (School Development Program, 2001).

The Language Pathway

The language developmental pathway builds the capacity for receptive and expressive language in a variety of contexts (Comer, 1999). Cognitive development is mediated through language. This pathway involves the ability to receive and express oneself through both spoken and written language (School Development Program, 2001).

The Psychological Pathway

The psychological developmental pathway involves self-confidence, self-esteem, and the ability to gain control over individual feelings, and to accept oneself (Comer, 1999). Increasing the capacity for acceptance and confidence in oneself during the ongoing process of identity formation is the focus of the psychological pathway (School Development Program, 2001).

The Developmental Pathways and Technology

Technology has the potential to alter how students learn, how teachers facilitate learning, how students demonstrate knowledge acquisition, and how individuals interact within the learning environment. Technology is a powerful tool that is capable of consistent independent practice, able to personalize the assessment process, and a way to

manipulate information in order to reach a higher level of understanding. Technology is not a substitute for any of the following: the acquisition of skills, knowledge, and cognition; a replacement for the mastery of basic skills; nor should the curriculum focus only on learning technology. Teachers learn to integrate technology and emphasize critical thinking and problem-solving skills in their instruction (Branigan, 2002). A recent analysis of student test scores provides substantial evidence to indicate that the utilization of technology to facilitate an inquiry-based approach to learning can increase student achievement (Branigan, 2002).

The Ethical Pathway and Technology

Roblyer and Edwards (2000) stated that technology users represent society in a microcosm. Carpenter (as cited in Roblyer and Edwards, 2000) defined three major kinds of ethical and legal issues common to technology: copyright infringement, illegal access, and online ethics. Software piracy is a common example of copyright infringement. Hacking is the general term used for illegal access. Online ethics is a recent development due primarily to the proliferation of inappropriate websites.

In recent years objectionable material, Internet predators, viruses, copyright violations, and proper Internet behavior have become important issues. Schools can install firewalls and filtering software to eliminate the majority of objectionable material. Students should be instructed to never provide personal information to anyone they contact through the Internet. Schools should never give names of students on web pages.

Examples of good Internet behavior have been compiled by Kosma (cited in Roblyer and Edwards 2000) and include the following: personal identification, include a subject line, avoid sarcasm, respect the privacy of others, acknowledge and return

messages promptly, copy with caution, don't send junk mail (spam), be concise, and use appropriate language (available at www.pass.wayne.edu/~twk/netiquette.html).

Barbour (cited in Raskind and Higgins, 1995) contended that there are three fundamental views of technology: technology as a liberator; technology as a threat; and technology as an instrument of power. These three views can be roughly characterized as optimistic, pessimistic, and contextual, respectively.

Implications for Intellectual Excellence

In the EDUC 200 (Technology in the Classroom) course at Drury University students are given instruction in the ethical uses of computers and allied technologies. Each student is required to sign up for a Drury University e-mail account. Part of the sign-up process is that students must read and sign a policy and ethics statement. In any Drury University course, students are expected to abide by the academic honesty and integrity clause in the university catalog.

Another assignment that highlights the role of ethics in the EDUC 200 course is the development of a prototype Internet usage agreement to include the benefits of technology in the classroom, standards for acceptable usage, and sanctions for unacceptable usage. Most of the students who take this course are in the process of earning teacher certification. It is hoped that when these students are hired by local school districts they will be able to implement appropriate Internet usage agreements with their students. Many school districts already have such agreements in place. In order to develop their prototype the EDUC 200 students conduct Internet research to find and evaluate existing agreements.

The Social Pathway and Technology

Roblyer and Edwards (2000) note that spending too much time on computers, especially to deliver online courses is considered harmful to the development of relationships and social skills by children.

Grabe and Grabe (2000) accurately state that learning is a social phenomenon. The social context of learning includes teachers, students, and communities (including virtual ones) beyond the school. They describe three major concepts of the social context of learning: cognitive apprenticeships, cooperative learning, and learning communities.

Cognitive apprenticeships in the Vygotskyan tradition place the learner in the role of an apprentice to a more expert practitioner, either the teacher or an outside authority. Reciprocal teaching is one manifestation of a cognitive apprenticeship. Group Internet projects are an excellent way to provide for interactions between the teacher and the student.

Cooperative learning requires students to work together to accomplish a learning task. Goals are accomplished through motivating, teaching, evaluating, or engaging the others in the group. An effective cooperative learning group can encourage active learning. The Internet provides new options for cooperative learning. The opportunities for communication, inquiry, or construction ensure a good starting point for cooperative learning groups.

Learning communities are social organizations created by people who share common goals, values, and practices. The Internet affords the opportunity to create virtual learning communities. While these are advantageous in many respects, Grabe and Grabe (2000) caution that these virtual learning communities should never take the place

of face-to-face interaction. Distance or distributed learning is another manifestation of learning communities made possible by the rise of the Internet.

Jonassen (2000) advocated the use of asynchronous conferencing as a mind tool to facilitate learning. Asynchronous conferencing can be accomplished through the use of online chat rooms and bulletin board services. Roueche and Roueche (2002) in discussing on-line chat rooms maintained that such avenues lose a valuable dimension because of the lack of energy generated by sheer physical presence.

Kraut, et al. (1998) provided evidence that researchers are divided over the social implications of technology. Some believe that people become cut off and socially isolated by using technology for communication while others believe the Internet causes better and stronger relationships because isolation and geographical restraints have been overcome. The authors point out that strong personal relationships are generally supported by close physical proximity. Most of the relationships maintained via technology are weak. Their research discovered that the Internet causes a decline in social involvement because it displaces social activity and strong ties.

Implications for Intellectual Excellence

In the EDUC 200 (Technology in the Classroom) course at Drury University students have multiple opportunities to incorporate the social pathway into their learning process. One of the primary ways this is accomplished is through the required field experience. Each student is required to schedule four hours of observation in a local school district to see technology usage in the school environment. This assignment requires students to interact with both public school teachers and students.

Students work together on several assignments in the EDUC 200 class. They work in teams to evaluate educational software and they share the results of their final projects with others in the class. The final project incorporates all facets of the course material (internet use, Power Point, and Microsoft Word applications) into a single comprehensive project. Through the use of the presentation equipment available in the computer lab, the students are able to present two Power Point presentations through the course of the semester. One presentation is an autobiographical review of their life; the other consists of using Power Point to teach a lesson they have created.

The use of in-class discussions is prominent to disseminate the information required to complete the course requirements. Students also have the opportunity to present two current event presentations dealing with technology and the learning process. These current event presentations generate a considerable amount of discussion among the students.

The ERes course page allows for student interaction even when the class is not in session. By posting messages on the class discussion board students can obtain help for a difficult assignment or simply interact with one another in an asynchronous environment. The students' work is also posted to their folder on the ERes page creating a virtual portfolio that they can share with others.

In the EDUC 200 course there is a wide divergence of skill levels. One of the best features of the social pathway is the ability for one student to help another. Collaboration and scaffolding are encouraged.

The Physical Pathway and Technology

Issues inherent in a discussion of the physical pathway and technology revolve around two points: first, the need for adaptive technology to allow disabled students the opportunities to use technology and second, the prevention of health related problems such as carpal tunnel syndrome due to the use of technology.

Roblyer and Edwards (2000) emphasize the importance of federal legislation, in particular The Education for All Handicapped Children Act of 1975 and The Individuals with Disabilities Act of 1990 in providing equal and adequate access to technology for students with disabilities. They contend that technology systems can allow people to communicate and move around on their own giving them a level of freedom and self-determination. However, they also report on problems due to cost and appropriateness and maintain that technology cannot cure handicapping conditions. Technology should be viewed as an aid rather than a cure.

Implications for Intellectual Excellence

Schools must provide adequate training to students to insure that they do not develop health problems related to technology. Since physical development encompasses both outward physical attributes and unseen attributes such as visual acuity and hand-eye coordination, as well as dexterity, the EDUC 200 course is geared to the development of computer skills such as the integration of visual and auditory stimuli into presentations, the enhancement of fine motor skills (mouse handling), and an appreciation for the problems encountered by physically disabled students.

Each of the course requirements for EDUC 200 requires the use of one or more of the unseen physical attributes: visual acuity, dexterity, hand-eye coordination, or auditory perception.

The Cognitive Pathway and Technology

Technology can support the cognitive pathway as a tool to access, organize, and interpret information. The Internet and encyclopedic-software programs can allow students to have immediate access to current research and information. Computer software that provides word processing programs, spreadsheet capabilities, and electronic presentation formats can help students synthesize the collected information and disseminate the material through an effective mode of communication. The following types of technology can provide support for the cognitive pathway:

- CAI/Drill/Practice/Tutorial
- Computer Projector
- Simulation/Educational Games
- Web Page Development
- Electronic Chalkboard
- Electronic Library Access

Implications for Intellectual Excellence

In the EDUC 200 course at Drury University, all of the assignments are specifically geared toward the cognitive pathway. Through the processes of accessing, organizing, and interpreting information students are presented with numerous opportunities in multiple contexts for cognitive pathway development.

The Language Pathway and Technology

According to research studies there is a robust relation between learning stimulation and language competence and learning stimulation is associated with the size of an individual's vocabulary (Bradley, Corwyn, Burchinal, McAdoo, & Coll, 2001). Language enhancement activities can be supported by technology in the following manner:

- E-mail
- Word Processing
- Internet Web Sites
- Videos
- Software Programs
- Video Camcorder/Digital Camcorder

Implications for Intellectual Excellence

In the EDUC 200 course the language pathway is developed through the sharing of student projects. From the simple use of email communications to standing in front of the class to present a current event students are continuously provided with opportunities to develop the language pathway.

Students are required to give three Power Point presentations to their classmates, one is an autobiographical representation of their life, another is using Power Point to teach a lesson, and the third is the Final Project where students utilize the Internet to develop a thematic scavenger hunt and then prepare a Power Point presentation to introduce the theme.

The Psychological Pathway and Technology

Managing personal emotions in socially accepted ways is an essential personal skill. What people do with their emotions is important. Is it possible that students behave the way they feel? And if they are behaving badly, is that because they are feeling badly? Technology can be used to address the psychological pathway by:

- Electronic journals
- Electronic calendars
- Scanner
- Authoring or Multimedia
- Computerized Testing
- Electronic Student Portfolio
- Authoring/Multimedia
- Desktop Publishing
- Open Lab Access
- Individual Computers
- Teleconferencing
- Interactive Video
- Educational Television

Implications for Intellectual Excellence

In the EDUC 200 course the psychological pathway is developed through student interactions and cooperation. The best example of the use of the psychological pathway is demonstrated in the final project. In this project students select a theme (e.g. baseball or frogs), they then conduct Internet searches to identify web pages that deal with that

theme, then the students construct a learning activity based upon information or activities found on those web pages. The students then create a Power Point presentation to stimulate interest in their theme. The culminating activity for the course involves students exchanging their final projects and trying them out.

Summary

Researchers have reached a consensus that there is a dynamic interplay between individuals and their environments (Bradley, et al, 2001). Dr. James Comer has provided a comprehensive framework for understanding the complexity of not only children, but of all human beings. In the EDUC 200 course at Drury University the theoretical implications of Dr. Comer's work are being put to the test. Our students demonstrate the enhanced intellectual excellence that the developmental pathways can provide.

References

Bradley, R. H., Corwyn, R. F., Burchinal, M., McAdoo, H. P., & Coll, C. G. (2001). The home environments of children in the United States Part II: Relations with behavioral development through age thirteen. *Child Development, 72* (6), 1868-1886.

Branigan, C. (2002, March 13). Study: Missouri's ed-tech program is raising student Achievement. *eSchool News*. Retrieved March 13, 2002, from http://www.eschoolnews.org/index.cfm.

Carpenter, C. (1996). Online ethics: What's a teacher to do? *Learning and Leading with Technology, 23* (6), 40-41, 60.

Comer, J. P. (1993). School power: Implications of an intervention project. The Free Press: New York.

Comer, J. P. & Emmons, C. (in press). The school development program. In comprehensive school reform. In Block, et. al. (Eds), *A program perspective*.

Comer, J. P., Ben-Avie, M., Haynes, N. M., & Joyner, E. T. (1999). *Child by child: The Comer process for change in education*. Teachers College Press: New York.

Cook, T. D., Hunt, H. D., & Murphy, R. F. (1998). *Comer's school development program in Chicago: A theory-based evaluation*. Northwestern University: Institute for Policy Research. Retrieved March 14, 2002, from http://www.northwestern.edu/ipr/publications/comer.pdf

Gilligan, C. (1982). *In a different voice*. Cambridge, MA: Harvard University Press.

Gillette, J. (1995). Child-Centered planning: An overview. Yale Child Study Center School Development Program.

Grabe, M. & Grabe, C. (2000). *Integrating the Internet for meaningful learning.* Boston: Houghton Mifflin.

Jonassen, D. (2000). *Computers as mindtools for schools* (Second edition). Upper Saddle River, NJ: Merrill.

Kohlberg, L. (1984). *The psychology of moral development: The nature and validity of moral stages.* San Francisco: Harper and Row.

Kosma, T. Cyberlore No. 1: Netiquette 101. Available online at www.pass.wayne.edu/~twk/netiquette.html

Kraut, R., Patterson, M., Lundmark, V., Kiesler, S., Mukopadhyay, T., & Scherlis, W. (1998). Internet paradox: A social technology that reduces social involvement and psychological well-being? *American Psychologist, 53* (9), 1017-1031.

Raskind, M. & Higgins, E. (1995). Reflections on ethics, technology, and learning disabilities: Avoiding the consequences of ill-considered action. *Journal of Learning Disabilities, 28* (7), 425-439.

Robyler, M.D. and Edwards, J. (2000). *Integrating educational technology into teaching* (Second edition). Upper Saddle River, NJ: Merrill.

Roueche, J. & Roueche, S. (2002). Keeping balance: When technology meets core values. *Community College Week (Spring Supplement)*, March 2002, 3-7.

School Development Program. (2001). *Developmental Pathways Poster.* Retrieved March 14, 2002, from http://www.med.yale.edu/comer/about/pathways.html